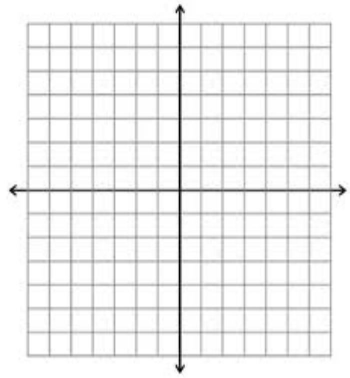
Precalc Warm Up # 7-1

1. Graph f(x) and its inverse on the same graph.

   $f(x) = (x + 2)^2 - 1$



2. State the domain and range for both.

   f(x): d
   r

   Inverse: d
   r

3. Is the inverse a function?

4. If so, find an equation for $f^{-1}(x)$.
   If not, restrict the domain of f(x), then write an equation for $f^{-1}(x)$.

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$\boxed{5.}$ $y = \cot \pi x$

$\boxed{9.}$ $y = \tan 2x$

$\boxed{13.}$ $y = -2 \sec 4x$

$\boxed{19.}$ $y = \csc \frac{x}{2}$

$\boxed{21.}$ $y = \cot \frac{x}{2}$

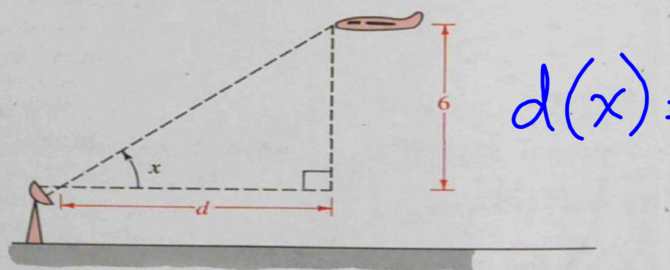
$\boxed{25.}$ $y = \tan\left(x - \frac{\pi}{4}\right)$

$\boxed{29.}$ $y = \frac{1}{4} \cot\left(x - \frac{\pi}{2}\right)$

$\boxed{31.}$ $y = 2 \sec(2x - \pi)$

$\boxed{35.}$ $y = \csc(\pi - x)$

37. A plane flying at an altitude of 6 miles over level ground will pass directly over a radar antenna (see figure). Let d be the ground distance from the antenna to the point directly under the plane and let x be the angle of elevation to the plane from the antenna. Write d as a function of x, $0 < x < \pi/2$.

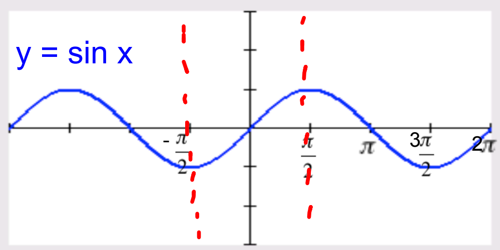


$$d(x) = \frac{6}{\tan x}$$

$$\tan x = \frac{6}{d}$$

$$d = \frac{6}{\tan x}$$

$6 \cot x$



1. Is y = sin x a function?
yes

2. Is its inverse a function?
No

3. How could we restrict the domain so that it is as large as possible and its inverse is a function?
$= \arcsin x$ dom: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ range: $[-1, 1]$

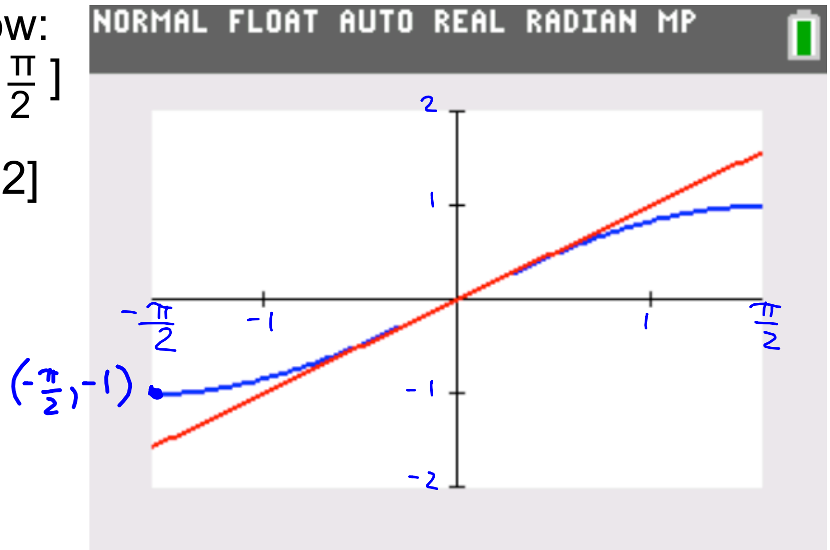
4. $f^{-1}(x) = \sin^{-1} x$
dom: $[-1, 1]$ range: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
angle

What would the graph look like?

Graphers: y = sinx and y = x

Window:
x: $[-\frac{\pi}{2}, \frac{\pi}{2}]$

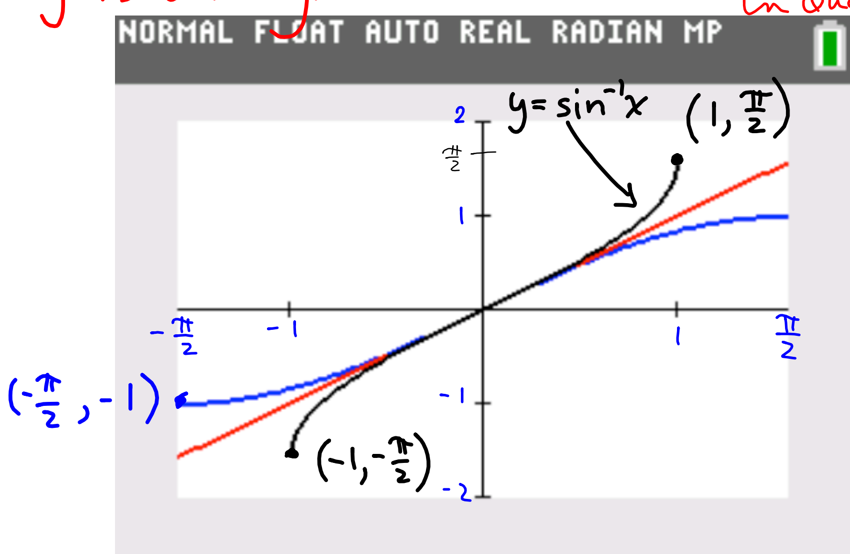
y: [-2, 2]



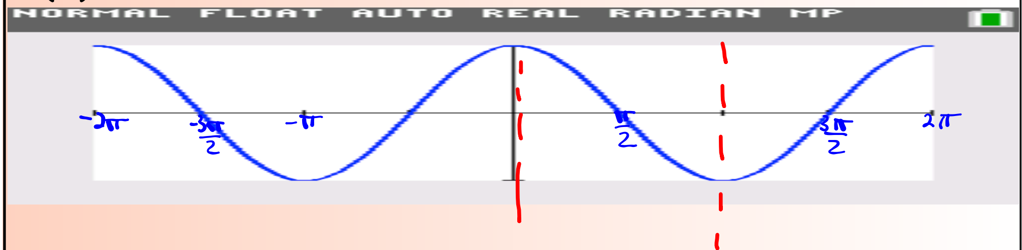
$y = \sin^{-1}x$ dom: [-1, 1] range: $[-\frac{\pi}{2}, \frac{\pi}{2}]$

y is an angle.

an angle in Quadrant I or IV



$f(x) = \cos x$



How would you restrict the domain of $f(x) = \cos x$ so that its inverse is also a function? dom: $[0, \pi]$ range: $[-1, 1]$

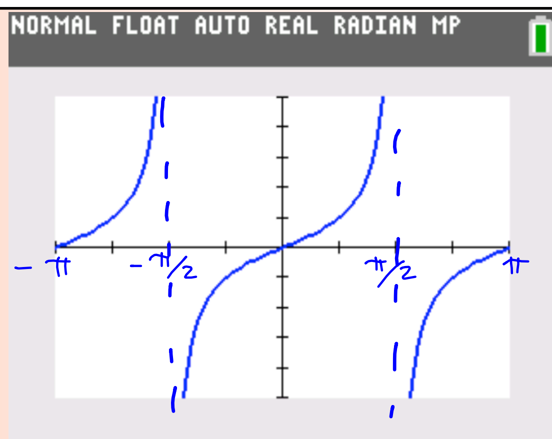
$f^{-1}(x) = \cos^{-1}(x)$

dom: $[-1, 1]$

range: $[0, \pi]$

angles for out comes

$f(x) = \tan x$

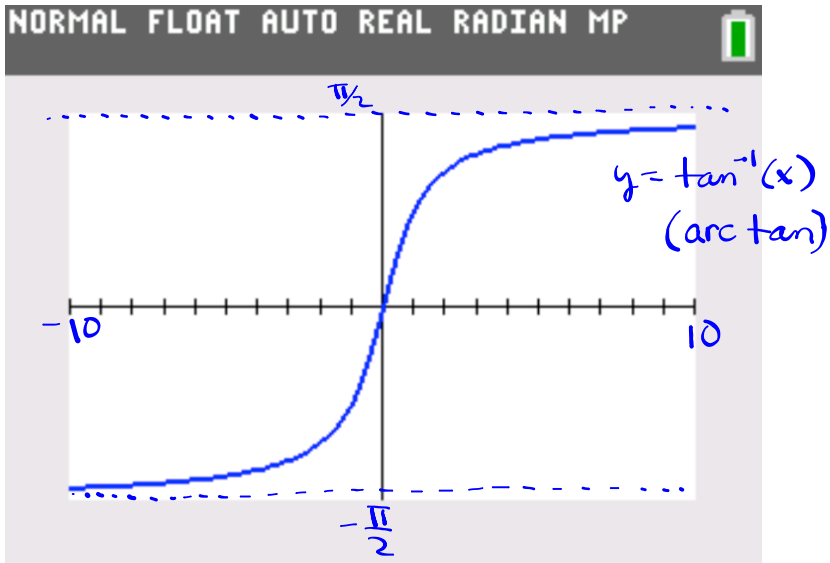


How would you restrict the domain of $f(x) = \tan x$ so that its inverse is also a function? dom: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ range: $\mathbb{R}$

$f^{-1}(x) = \tan^{-1} x$

dom: $\mathbb{R}$

range: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

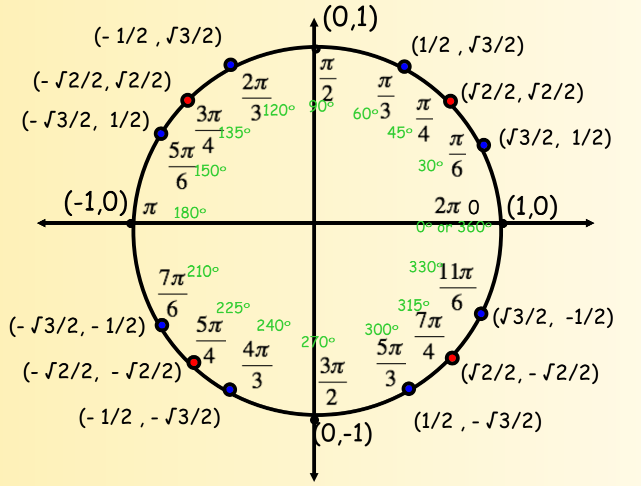


Definition of the Inverse Trig Functions

Function	Domain	Range (θ)
y = arcsin x if and only if x = sin y	$-1 \le x \le 1$	$\frac{-\pi}{2} \le y \le \frac{\pi}{2}$
y = arccos x if and only if x = cos y	$-1 \le x \le 1$	$0 \le y \le \pi$
y = arctan x if and only if x = tan y	$-\infty < x < \infty$ all reals	$\frac{-\pi}{2} < y < \frac{\pi}{2}$

y = arcsin x is just a different notation for $y = \sin^{-1} x$

$\theta \leftarrow \sin^{-1}x \neq \frac{1}{\sin x} \rightarrow \csc x$



Find:

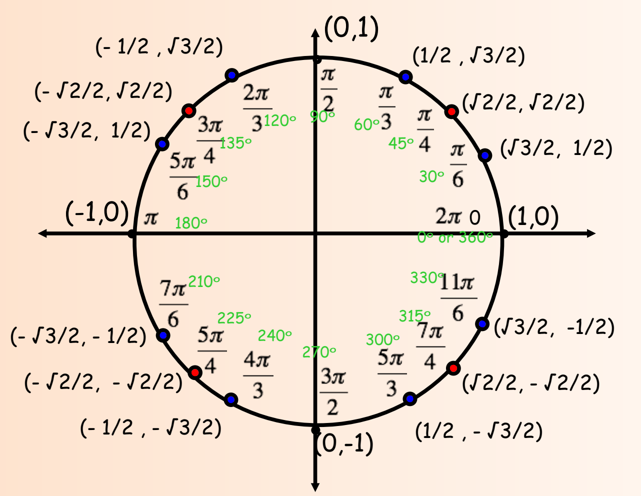
1. $\arcsin\left(-\frac{1}{2}\right)$

$-\frac{\pi}{6}$

2. $\arccos\left(-\frac{1}{2}\right)$

$\frac{2\pi}{3}$

3. $\sin^{-1}\sqrt{\frac{3}{2}}$ $= \frac{\pi}{3}$



Find:

4. arccos(-1)

π

5. arcsin (-2)

6. arctan (-2)

$\theta \approx -1.11$ rad.

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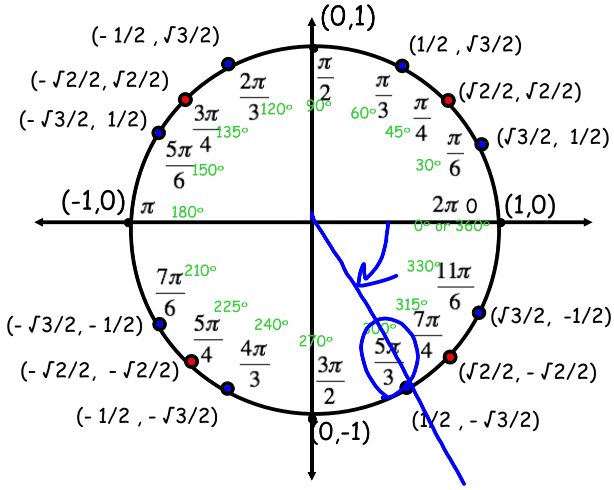


Find:

7. $\arcsin\left(\sin\frac{\pi}{6}\right)$

$\frac{\pi}{6}$

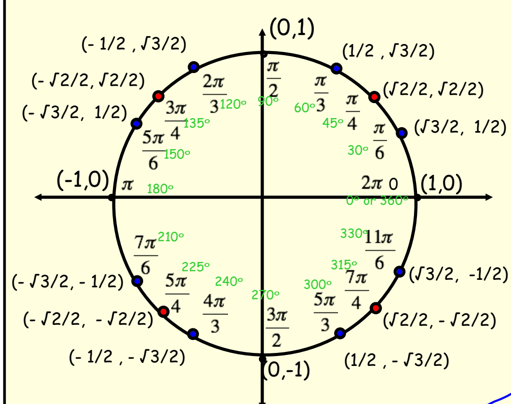
8. $\arccos\left(\cos\frac{3\pi}{2}\right)$

$\arccos(0)$

$\frac{\pi}{2}$

9. $\arcsin\left(\sin\frac{5\pi}{3}\right)$

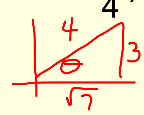
$-\frac{\pi}{3}$



Find: θ in I

10. $\tan\left(\arcsin\frac{3}{4}\right)$

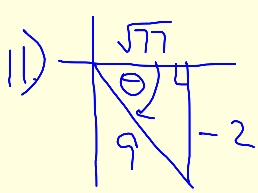
$\tan\theta = \frac{3\sqrt{7}}{7}$



11. $\cos\left(\sin^{-1}\left(-\frac{2}{9}\right)\right)$

θ in IV

11)

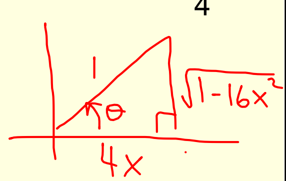


$\cos\theta = \frac{\sqrt{77}}{9}$

θ in I

12. $\cot(\arccos 4x)$

$0 \le x \le \frac{1}{4}$



$\cot\theta = \frac{4x}{\sqrt{1-16x^2}}$

HW: PC book

p. 380 box, (skip 67)

HW Week 6 tomorrow:
PC book pages
329, 339, 352, 363